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Notes on Plumage Changes in the Quetzal.

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(Plate I).

On October 29, 1937, nine young Quetzals (*Pharomachrus mocinno mocinno* De la Llave) were received at the New York Zoological Park. Six were forwarded a few weeks later to the Zoological Society of London. Of the remaining three, one died on December 14, 1937, from a bacterial invasion of the lung. The second, which had suffered a wing injury before arrival, survived until June 16, 1938. The third bird, a male, lived until March 3, 1939, and it was on this specimen that the following observations were made.

Before the arrival of these birds, there appear to be no records of living specimens having reached either Europe or America. In 1914, when in San José, Costa Rica, I called on the late Señor José C. Zeledón who was closely connected with the development of Costa Rican ornithology. The discussion turned to Quetzals and I was informed that Señora Zeledón had possessed two birds of the Costa Rican form (*Pharomachrus mocinno costaricensis* (Cabanis)), at different times. Each had been kept without difficulty for six months but had been liberated in turn "because they smelled so bad." I know of no other instance of Quetzals having been kept in captivity.

The birds received at the Zoological Park had been taken from the nest in the mountains of Honduras and were hand-reared by Dr. Wolfgang von Hagen. Collections were made in July and August, the birds being still unable to fly at that time. On arrival, they checked well against the nestling plumage described by Ridgway¹ except that all showed some infusion of green in the scapulars and upper wing coverts. Since Ridgway's description was taken from a nestling of the Costa Rican form, this difference may be accounted for. In all, the bill was black, iris dark brown, feet gray-blue.

About January 1, 1938, a molt was begun by the bird under observation. By January 24, the upper plumage had become bright green, except for the head, which remained brown. The throat and upper breast were gray, scaled with green, the lower chest was clear gray, the abdomen and under tail coverts were rosy salmon. The elongated upper wing coverts reached a length of about two inches. Remiges and rectrices were not molted. The bill was black.

On March 15, it was noted that both upper and lower mandible were becoming suffused with yellow. The two bright green middle upper tail coverts, which had been growing slowly, now reached their maximum length, which was just short of the tips of the rectrices.

The brown feathers of the head began a slow process of replacement about April 15. By June 9, the change to bright green was complete,

¹ Ridgway, Robert. Birds of North and Middle America, part V, p. 737.

although the crest was but slightly developed. Yellow areas of the bill had increased, leaving only a dark spot over each nostril and at the tip of each mandible. At this stage, the bird checked closely with Ridgway's "immature male."

On July 10, a tail feather was dropped and on the 28th, another. Beginning on July 20, there was a general molting of body feathers. This continued for several days but then checked and was not resumed until about September 10. On the 16th of this month, a middle upper tail covert was dropped and was found to measure 185 mm. in total length.

By mid-October, the molt was in full swing, with body feathers, remiges and rectrices being rapidly replaced. The plumage change was complete by November 15, when the following description was taken: Upper parts golden green, crest well developed. Upper breast green, gray of lower chest interspersed with deep crimson. Vent and under tail coverts geranium red. The two middle upper tail coverts projected about three-quarters of an inch beyond the rectrices. Elongated greater wing coverts green for most of their visible length, the black bases barely discernible. Remiges black, primaries and outer secondaries edged with buff. Three inner pairs of rectrices black, three outer pairs white, the bases barred with black, white areas increasing outward. Bill clear yellow, feet pale gray-blue, iris dark brown.

This plumage appears to represent a stage intermediate between Ridgway's "immature male" and "adult male." It is quite possible that there may be further stages, since it seems unlikely that the superb beauty of the adult could be attained except by degrees. The molt of this bird is noteworthy for its almost continual progression, since there was hardly a time when change was not occurring in some part of its plumage. On the other hand, once the stage described above had been reached, on November 15, 1938, there were no changes up to the time of the bird's death on March 3, 1939.

Immediately after death, the following notes were made, measurements being in millimeters: length, to end of rectrices, 357; wing, 188; tail, 190; right middle upper tail covert, 203; left, 213; crest, 26; culmen, 16; tarsus, 16. Weight, 108 grams. Sex ♂.

EXPLANATION OF THE PLATE.

- Fig. 1. Nestling plumage, photographed November 18, 1937.
Fig. 2. First immature plumage, photographed July 5, 1938.
Fig. 3. Second immature plumage, front view, photographed February 20, 1939.
Fig. 4. Second immature plumage, rear view, photographed February 20, 1939.